Conditions Distribution

By toolie, December 7, 2013 in Tecmo Super Bowl - NES

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toolie

Tecmo Legend

Mods: HSRL

2,808

4,263 posts

Location: Michigan

The Boogedy Man Walked All Over Me!

Posted December 7, 2013

Report post

So I'm a math guy, and I was interested in the problem of what the distribution of conditions would approach as the season goes on. Currently, with two games to play in week 15 of WTF: 2.0 (which tracks conditions), the distribution of conditions is this...

600 total players (20 teams, 30 players per team).

Bad (: 123 (20.5%)

Average (A): 215 (35.8%)

Good (G): 184 (30.7%)

Excellent (E): 68 (11.3%)

Injured (I): 10 (1.7%)

From the forums, I read (via bruddog) that the chances of changing conditions goes like this:

B: 25% stay in bad, 75% move to average 0% move to good, 0% move to excellent

A: 25% move to bad, 50% stay in average, 25% move to good, 0% move to excellent

G: 0% move to bad, 25% move to average, 50% stay in good, 25% move to excellent

E: 0% move to bad, 0% move to average, 75% move to good, 25% move to average

To model the flow of conditions, I used a very simple model that neglects injuries. The flow can be modeled using a 4x4 matrix T and a 4x1 conditions vector v, where the columns of the matrix T contain numbers based on the above percentages that sum to one, and the conditions vector v holds the number of players in each condition. At the start of the season, the conditions vector v = [0, 600, 0, 0] since everyone is in A. I'm writing this as a row vector for convenience, but for the matrix multiplication it needs to be a column vector.

After each quarter, we perform the multiplication T*v, which produces the theoretical distribution of players

after conditions change. After one quarter, v = [150, 300, 150, 0]. After two quarters, v = [112.5, 300, 150, 37.5]. After three quarters (and hence the first game, since conditions don't change after the 4th quarter) v = [103.125, 271.875, 178.125, 46.875]. So we have fractions of players in each state, which seems silly, but that's just a slight downside of the modeling process.

After six games of this iterative process (just taking the output vector and hitting it with the matrix T 18 times) the distribution has settled in to be roughly v = [75.09, 225.16, 224.84, 74.91]. So it looks like the steady-state distribution of players would be v = [75, 225, 225, 75]. This is the case for this model. If we hit that vector v with T the output will not change. We can also show this using some matrix algebra, but we'll skip that for now.

So the steady-state percentages for the distribution in this model are 12.5%, 37.5%, 37.5%, and 12.5% (1/8, 3/8, 3/8, 1/8). Our actual percentages are currently 20.5%, 35.8%, 30.7%, 11.3% (with 1.7% injured). After 15 weeks the system has had a lot of time to approach a steady-state distribution, if there is one, so injuries seem to make a significant impact on the numbers, or the system is just currently in a state of bias towards bad conditions.

Improving the model to incorporate injuries seems doable enough, but there will be MANY more states due to the fact that you can't return from injury after every quarter. There is

probably a way to incorporate injuries in an average sense, which would reduce the number of states (and hence the size of the matrix and vector) but I'd have to think about how to do that a bit more.

One way to eliminate injuries is by taking out the players that can get injured (QB,RB,WR,TE). That leaves 18 players per team (360 total). The current distributions there are

B: 20.3%

A: 35.3%

G: 32.5%

E: 12.0%

Pretty similar to the numbers with everyone involved, but not too far from the steady-state values. This season it looks like these non-injury-prone players as a whole have had slightly bad luck.

+ Quote

4

vikingmoe02, buck, manYo and 1 other reacted to this

HSTL Three-Peat: Seasons 25, 26, & 27

HSRL 1970 Champion

Play through adversity...

bruddog

Down with button mashing

Moderators

Posted December 11, 2014

Report post

> **On 12/7/2013 at 5:11 PM, toolie said:**
>
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3,074
11,466 posts
Location: Ca

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>
> Pretty similar to the numbers with everyone involved, but not too far from the steady-state values. This season it looks like these non-injury-prone players as a whole have had slightly bad luck.

I
was wrong I finally figured out the condition code routine

B: 75% stay in bad, 25% move to average 0% move to good, 0% move to excellent
A: 12.5% move to bad, 75% stay in average, 12.5% move to good, 0% move to excellent
G: 0% move to bad, 12.5% move to average, 75% stay in good, 12.5% move to excellent
E: 0% move to bad, 0% move to average, 25% move to good, 75% stay in excellent

+ Quote

5
vikingmoe02, toolie, kamphuna8 and 2 others reacted to this

brookstonfowler

phile guru

Members
930
7,743 posts
Location: zionsville, in
Tecmo Titles: 3
I feel pretty free.

Posted December 11, 2014

Report post

wow. that makes more sense of why guys stay in Exc for a few games at a time. i'm sure you guessed my next question. is there a way to tweak the %'s?

+ Quote

WTF champs: 1993, 2011, 2015
Retro champs: 1975
animated championship gifs
Rick & Roll

bruddog

Down with button mashing

Posted December 11, 2014

Report post

Ya i made a simulation in excel and you can see guys stay in conditions for a long period of time.

Moderators

3,074
11,466 posts
Location: Ca

```
L_17_A395:                                  ; UPDATE CONDITION ROUTI
LDA #$80                                    ; Allow SRAM write
STA PRG_RAM_PROTECT                         ;
LDA $70                                     ; save possesion byte ir
STA $42                                     ;
LDA #$00                                    ; SET TEAM to player 1
STA $70                                     ;
@Loop1:                                     ; CONDITION LOOP INIT
LDA #$00                                    ; SET current player to
STA $44                                     ;
@Loop2:                                     ; CONDITION LOOP WHILE L
LDA $44                                     ; LOAD current player to
JSR L_DE15                                  ; CHECK if player is inj
LDA #$01                                    ; LOAD Average condition
BCS @Loop6                                  ; Player injured? YES->E
JSR L_D8F7                                  ; LOAD more random rand
AND #$18                                    ; 25% chance of conditio
BNE @Loop10                                 ; CONDITION CHANGE? NO->
LDA $44                                     ; LOAD player
JSR L_DE2F                                  ; GET PLAYER CONDITION(A
STA $45                                     ; SAVE in $45= current c
```

```
CMP #$00                                ; PLAYER IN BAD?
BEQ @Loop3                              ; YES-> JUMP to LOAD 1
CMP #$03                                ; PLAYER IN EXCELLENT?
BEQ @Loop4                              ; YES->PLAYER IN EXCELLE
JSR update_random_3B                    ; ELSE IF PLAYER IN AVG/
AND #$02                                ;
SEC                                     ;
SBC #$01                                ;
JMP @Loop5                              ; JUMP TO CURRENT CONDIT
@Loop3:                                 ; LOAD 1
LDA #$01
JMP @Loop5                              ;JUMP TO CURRENT CONDITI
```

```
@Loop4:                                 ; LOAD -1
LDA #$FF
@Loop5:                                 ; CURRENT CONDITION + VA
CLC
ADC $45
@Loop6:                                 ; GET NEW CONDITION BACK
STA $45                                 ;
LDA #$FC                                ;
STA $43                                 ;
```

```
LDA $44                                 ;
EOR #$FF                                ;
AND #$03                                ;
BEQ @Loop8                              ;
TAX                                     ;
@Loop7:                                 ;
ASL $45                                 ;
ASL $45                                 ;
SEC                                     ;
ROL $43                                 ;
ROL $43                                 ;
DEX                                     ;
BNE @Loop7                              ;
@Loop8:
LDA $44                                 ;
LSR                                     ;
LSR                                     ;
TAY                                     ;
BIT $70                                 ; PLAYER 1 or 2?
BMI @Loop9                              ; PLAYER 2-> BRANCH TO S
LDA $6503,Y                             ; SAVE NEW CONDITION FOR
AND $43                                 ;
ORA $45                                 ;
STA $6503,Y                             ;
```

```
JMP @Loop10                                     ; JUMP TO INCREMENT PLAY
@Loop9:                                         ; SAVE NEW CONDITION FOR
LDA $6608,Y                                     ;
AND $43                                         ;
ORA $45                                         ;
STA $6608,Y                                     ;
@Loop10:                                        ; INCREMENT PLAYER AND C
INC $44                                         ; increment to next play
LDA $44                                         ;
CMP #$1E                                        ; All PLAYERS DONE?
BCC @Loop2                                      ; NO->BRANCH to CONDITIO
LDA $70                                         ; Player 2 TEAM done?
BMI @Loop11                                     ; YES->BRANCH to RESTORE
LDA #$FF                                        ; NO->SET Possession to
STA $70                                         ;
JMP @Loop1                                      ; JUMP TO CONDITION LOOP
@Loop11:                                        ; RESTORE POSSESSION BYT
LDA $42                                         ;
STA $70                                         ;
LDA #$C0                                        ; SET SRAM to NOT WRITEA
STA PRG_RAM_PROTECT                             ;
RTS                                             ; RETURN
```

+ Quote

toolie
Tecmo Legend
●●●●●●

Mods: HSRL
2,808
4,263 posts
Location: Michigan
The Boogedy Man Walked All Over Me!

Posted December 11, 2014 (edited) Report post

So I redid the matrix with the new transition probabilities. After 6 games (3 condition changes per game) the actual conditions of non-injury prone players was

B: 20.3%

A: 35.3%

G: 32.5%

E: 12.0%

And the computation (T^18)([0 1 0 0]') yields

B: 18.2%

A: 34.8%

G: 31.8%

E: 15.2%

Pretty close to the actual distribution. Steady-state values for each condition (as t goes to infinity) given these probabilities are

B: 16.7% (1/6)

A: 33.3% (1/3)

G: 33.3% (1/3)

E: 16.7% (1/6)

Edited December 11, 2014 by toolie

+ Quote

1
bruddog reacted to this

HSTL Three-Peat: Seasons 25, 26, & 27


HSRL 1970 Champion

Play through adversity...

bruddog

Down with button mashing

Moderators

3,074
11,466 posts
Location: Ca

Posted December 11, 2014

Report post

Brookston, yes with the current model its possible for the conditions to stay at the same place for a very long time....Here is a spreadsheet tool to see the possibilities for players with a nifty graph included (kinda like the one for wtf except only one season long)

Change C1 cell from 0(players never change) to (1) Players always change..

conditions_prob.XLS

+ Quote

1
brookstonfowler reacted to this

joelcsuh

Starter

Posted December 12, 2014

Report post

Does this work the same in all versions? (I know it doesn't in the Genesis version of TSB III but I don't want to derail the thread.)

Members
31
139 posts

I once had a season with the Chiefs in the NES version in which Stephone Paige was in Bad from week 2-17. Very frustrating. Never seen anything like it before or since.

+ Quote

bruddog

Down with button mashing

Moderators

3,074
11,466 posts
Location: Ca

Posted December 12, 2014

Report post

This is only for the nes version.

+ Quote

segathonsov

Tecmo Legend

Members
2,040
2,466 posts
Location: South of the River
R.O.Y Buring Mort 2

Posted December 23, 2014

Report post

Kind of related question. Is there a "sweet spot" where a guy goes into Good/Excellent more? Example does QB1 and QB2 change conditions the same or does the computer favor one.

From doing the conditions program sometimes it seems there is a pattern like RB1 and RB3 go into Bad at the same time.

+ Quote

bruddog

Down with button mashing

Posted December 23, 2014

Report post

There might be patterns because of the way the random number generation works but all of the positions have an equal chance.

+ Quote

1
segathonsov reacted to this

Moderators

3,074
11,466 posts
Location: Ca

BO FB Offtackle Left

Tecmo Legend

Members
253
3,135 posts
Location: New York

Posted January 7, 2015

Report post

> **On 12/11/2014 at 6:26 PM, brookstonfowler said:**
>
> wow. that makes more sense of why guys stay in Exc for a few games at a time. i'm sure you guessed my next question. is there a way to tweak the %'s?

Was it answered if there was a way to change the percentages? I might have missed it. If I could do whatever I wanted, I would do this:

B: 25% stay in Bad, 75% move to Avg
A: 12.5% move to Bad, 75% stay in Avg, 12.5% move to Good
G: 75% move to Avg, 12.5% stay in Good, 12.5% move to Exc
E: 75% move to Good, 25% stay in Exc

+ Quote

"There's nothing wrong with reading the game plan by the light of a jukebox."
- Kenny Stabler

bruddog

Down with button mashing

Moderators

3,074
11,466 posts
Location: Ca

Posted January 7, 2015

Report post

the way Conditions are done could be re-coded to just about anything.

+ Quote

toolie

Tecmo Legend

Mods: HSRL

2,808

4,263 posts

Location: Michigan

The Boogedy Man Walked All Over Me!

Posted January 7, 2015

Report post

> **On 1/7/2015 at 4:04 PM, BO FB Offtackle Left said:**
>
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>
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> A: 12.5% move to Bad, 75% stay in Avg, 12.5% move to Good
> G: 75% move to Avg, 12.5% stay in Good, 12.5% move to Exc
> E: 75% move to Good, 25% stay in Exc

With these probabilities, the long-term distribution of conditions would be roughly

Bad: 12%
Average: 74%
Good: 12%
Excellent: 2%

\+ Quote

1

BO FB Offtackle Left reacted to this

HSTL Three-Peat: Seasons 25, 26, & 27

HSRL 1970 Champion

Play through adversity...

bruddog

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Moderators

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Posted January 7, 2015

Report post

I'd probably recode it to a normal distribution (13.5, 68, 13.5, 5) which is pretty close to what BO did. And also make it so that you can change into any condition at any time and have players start off with conditions in the first quarter.

\+ Quote

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SBlueman